

Third Year Wetland Mitigation Site Monitoring for FAP 322 (U.S. 51), Macon County, Illinois – 2004

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Introduction

Wetland compensation activity has been initiated along U.S. 51 in Macon County, Illinois. The legal location of the site is NE1/4, SE1/4, Section 9, T. 15 N., R. 2 E. and SE1/4, SE1/4, NE1/4, Section 9, T. 15 N., R. 2 E. (Decatur, IL Quad). Prior to road construction this area had been farmed for over 75 years and cover consisted of corn and beans (Coopridier and Ketzner 2000). The pre-settlement environment consisted of wet and mesic prairie. Presently, the site is surrounded by road embankments and is mostly a depression within the infield of the U.S. 51 – Riley Road interchange. The mitigation site assessment and wetland compensation plan for this area suggested that an emergent wetland plant community (i.e. wet prairie, wet meadow, or marsh) would be the most likely development for this site (Coopridier and Ketzner 2000; IDOT 1996). Approximately 150 m (500 ft) west of the wetland mitigation site is the Elwin *Camassia* site (Brooks 1999; IDOT 1996). This site is a mesic to dry-mesic Illinois Natural Areas Inventory site that contains a population of the state endangered wild hyacinth, *Camassia angusta* (Engelmann & A. Gray) Blankinship (Herkert and Ebinger 2002).

According to Coopridier and Ketzner (2000), 0.79 ha (1.95 ac) of this infield was already wetland in 1999. Since then, the site has been shallowly excavated, mostly at the northern end of the infield, creating more low depressional ground to support a wetland. An emergent wetland community (wet prairie/marsh) is planned for this site. Construction of this wetland mitigation site was completed in June 2001. Illinois Natural History Survey (INHS) personnel began field monitoring of this area in 2002 and will continue for five years, as requested by the Illinois Department of Transportation (Brooks 2001). The Illinois State Geological Survey (ISGS) was also tasked to monitor the hydrology of this site. Project goals, objectives, and performance criteria are included in this report, as are monitoring methods, monitoring results, summary information and recommendations.

Project Goals, Objectives, and Performance Criteria

Proposed goals and objectives for this wetland mitigation project are based on information contained in the original wetland compensation plan for this site (IDOT 1996). Performance criteria are based on those specified in the *Corps of Engineers Wetland Delineation Manual* (Environmental Laboratory 1987) and *Guidelines for Developing Mitigation Proposals* (USACOE 1993). Each goal should be attained by the end of the five-year monitoring period. Project goals, objectives and performance criteria are listed below.

Project Goal #1: At the end of the five-year monitoring period the created wetland community should be a jurisdictional wetland as defined by current federal standards.

Objective: The created wetland should compensate for the loss of wetland.

Performance Criteria: The entire created wetland should satisfy the three criteria of the federal wetland definition: dominant hydrophytic vegetation, hydric soils, and wetland hydrology.

- A. Predominance of Hydrophytic Vegetation – More than 50% of the dominant plant species must be hydrophytic.
- B. Presence of Hydric Soils – Hydric soil characteristics should be present, or conditions favorable for hydric soil formation should persist at this site.
- C. Presence of Wetland Hydrology – The compensation area must be either permanently or periodically inundated at average depths less than 2 m (6.6 ft) or have soils that are saturated to the surface for at least 12.5% of the growing season.*

Project Goal #2: A native, non-weedy, emergent wetland community will be created.

Objective: Planting the area with high quality native emergent vegetation should reduce the pressures from successional, non-native, weedy species.

Performance Criteria: At least 50% of the plant species present should be non-weedy, native, perennial species. Furthermore, none of the dominant plant species may be non-native, cattails, or reed canary grass.

Methods

Monitoring of this wetland mitigation site began in 2002 and will continue for the standard five-year monitoring period. Illinois Natural History Survey (INHS) personnel will monitor the biological parameters and Illinois State Geological Survey (ISGS) personnel will monitor hydrology. Herbaceous vegetation will be monitored annually using standard sampling techniques (Cox 1985). Transects have been established perpendicular to a baseline running from northeast to southwest. The baseline begins at the ISGS surface water monitoring station (RDS2) on the north end of the site and follows along a bearing of 205° through the middle of the site. Transects are located along this baseline and start a minimum of 30 m from RDS2. Transects will alternate their orientation from the baseline, first running west from the baseline and then running east. Quadrats (1m²) will be placed at 5m intervals along each transect, beginning with a quadrat at the baseline. A minimum of 30 1m² quadrats will be sampled annually. Results and status of the created wetland site will be submitted to the Illinois Department of Transportation (IDOT) in yearly monitoring reports. The likelihood of meeting the proposed goals and performance criteria will also be addressed. If, at any time during the monitoring period, it appears that the goals/performance criteria will not be met at the end of the

* In some cases wetland hydrology can be met when a site is inundated or saturated for 5% to 12.5% of the growing season (Environmental Laboratory 1987).

five-year monitoring period, written management recommendations will be made to IDOT in an effort to correct any problems.

Floristic Quality Index

A complete list of all plant species found in the project area will be recorded annually and the Floristic Quality Index (FQI) will be calculated (Swink and Wilhelm 1979 and 1994; Taft *et al.* 1997). The FQI provides a measure of the floristic integrity or level of disturbance of a site. Each native plant species is assigned a rating between 0 and 10 (the Coefficient of Conservatism) that is a subjective indicator of how likely a plant may be found on an undisturbed site in a natural plant community. A plant species that has a low Coefficient of Conservatism (C) is common and is likely to tolerate disturbed conditions; a species with a high C is relatively rare and is likely to require specific, undisturbed habitats. Species not identified to species level are not rated and are not included in the calculations.

To calculate the FQI, first compute the mean C value (also known as mean rated quality), $mCv = \sum C/N$, where $\sum C$ represents the sum of the numerical ratings (C) for all species recorded for a site, and N represents the number of plants on the site. The C value for each species is shown in the species list for the site. Species that are not native to Illinois (indicated by * in the species list for each site) are not included in the calculations. The FQI for each site is determined by dividing the $\sum C$ value by the square root of N [$\sum C/(\sqrt{N})$]. An Index score below 10 suggests a site of low natural quality; below 5, a highly disturbed site. An FQI value of 20 or more ($mCv > 3$) suggests that a site has evidence of native character and may be considered an environmental asset.

Project Goal #1 At the end of the five year monitoring period the created wetland community should be a jurisdictional wetland as defined by current federal standards.

Wetland delineation will be completed yearly for all wetland community types at this compensation site. Since accurate boundaries may not be clear until several years of data have been gathered, wetlands will be marked on an aerial photograph after the plant communities have stabilized or at the end of the five year monitoring period. In addition, permanent photo stations have been established in the wetland restoration/creation area and photos will be taken annually in order to help monitor changes in the vegetation. Photos are included in Appendix 3 of the report.

A. **Predominance of Hydrophytic Vegetation** – The method for determining dominant hydrophytic vegetation is described in Environmental Laboratory (1987) and Federal Interagency Committee for Wetland Delineation (1989). This method is based on aerial coverage estimates for individual plant species. Each of the dominant plant species is assigned a wetland indicator status rating (Reed 1988). Any plant rated facultative or wetter (i.e., FAC, FAC+, FACW-, FACW, FACW+ and OBL) is considered hydrophytic. A predominance of hydrophytic vegetation in the wetland plant community exists if greater than 50% of the dominant species present are hydrophytic.

Dominant hydrophytic vegetation will be determined each year based on the results of systematic plant sampling. Cover of all species in each plot is assigned a cover class according to Daubenmire (1959) (Table 1). Frequency (proportion of quadrats in which a species occurred) and average cover (calculated using midpoints for each cover class) will be used to compute relative frequency (frequency of a species relative to total observations) and relative cover (cover relative to total observed cover), respectively. These two relative values are averaged to determine the importance value for each species sampled. Importance values will be used to determine dominant species. "Dominant species are the most abundant plant species (when ranked in descending order of abundance and cumulatively totaled) that immediately exceed 50% of the total dominance measure for the stratum, plus any additional species comprising 20% or more of the total dominance measure for the stratum" (FICWD 1989; Tiner 1999).

Table 1. Cover classes used in vegetation sampling

Cover Class	Range of Cover (%)	Midpoint of Range (%)
1	0-5	3.0
2	5-25	15.0
3	25-50	37.5
4	50-75	62.5
5	75-95	85.0
6	95-100	97.5
(Daubenmire 1959)		

B. Presence of Hydric Soils – Soils will be examined and described annually. A soil core collected from the same general area of the mitigation site will be examined for the presence of redoximorphic features. A detailed profile description of the soil using Munsell color charts to record soil colors will be included. Soil texture and structure will also be recorded. Hydric soils may develop slowly and characteristics may not be apparent during the first several years after project construction. In the absence of hydric soil indicators at that time, hydrologic data could be used as corroborative evidence that conditions favorable for hydric soil formation are present at the site.

C. Presence of Wetland Hydrology – The ISGS has been tasked to monitor hydrology at the proposed wetland site. To date they have installed two surface-water monitoring stations (RDS1 and RDS2), a rain gauge, two surface water staff gauges (A and B), and eleven monitoring wells (1S-8S and 10S-12S) (Watson and Sabatini 2002; Watson and Sabatini 2003; Plankell and Pociask 2004). ISGS personnel will measure water levels monthly. In addition, INHS scientists will survey the site annually for field indicators of wetland hydrology.

Project Goal #2 A native, non-weedy, emergent wetland community will be created.

Performance Criteria: At least 50% of the plant species present should be non-weedy, native, perennial species. Furthermore, none of the dominant plant species may be non-native, cattails, or reed canary grass.

A complete species list will be compiled each year and species will be recorded as native or non-native, weedy or non-weedy, and as a perennial, biennial, or an annual. Nativity of plants will be determined by consulting Mohlenbrock (1986; 2002) and Taft *et al.* (1997). Weedy species, for the purposes of this report, are defined as all non-native species and any native species assigned a Coefficient of Conservatism of 0 or 1 (Taft *et al.* 1997). Species given a C value of 0-1 correspond to Grime's ruderal species (Grime 1974; Grime *et al.* 1988) or species which are adapted to frequent or severe disturbances (Taft *et al.* 1997). Gleason and Cronquist (1991), Taft *et al.* (1997), and USDA, NRCS (2002) will be the primary sources used to determine whether a species is perennial, biennial, or annual.

Results

Floristic Quality Index: The Floristic Quality Index was calculated for this site using native species only. The wetland creation/restoration site had a FQI of 16.0 and a mean C value of 2.5. These values are indicative of fair natural quality. The upland buffer around the wetland site had a FQI of 14.4 and a mean C value of 2.8. Likewise, these values are characteristic of fair natural quality. In 2004, a total of 40 native species were found in the wetland community with a few species indicative of higher natural quality being present. Species present with a C value of 5 or greater: *Ammania coccinea*, *Aster puniceus*, *Lobelia cardinalis*, *Potamogeton pectinatus*, *Pycnanthemum virginianum*, *Solidago ridellii*, and *Sparganium eurycarpum*. Summary information for the created wetland site is given in Table 2.

Table 2. Summary table for FAP 322 wetland monitoring site, 2002 to 2004.

	2002	2003	2004
Total Species Richness	40	51	51
Native Species Richness	24	38	41
% Native	60%	75%	80%
% Non-weedy	23%	43%	51%
% Perennial	35%	47%	71%
% Native, Non-weedy, and Perennial	18%	29%	45%
Mean Conservatism	1.6	2.2	2.5
Floristic Quality Index (FQI)	7.8	13.6	16.0
% Wetland Species (FAC to OBL)	60%	78%	82%

Project Goal #1 At the end of the five year monitoring period the created wetland community should be a jurisdictional wetland as defined by current federal standards.

A. Predominance of Hydrophytic Vegetation – The performance criterion requires that greater than 50% of the dominant plant species be hydrophytic. Results for 2004 indicate that the dominant herbaceous species are *Leersia oryzoides* (OBL), and *Typha angustifolia* (OBL) (Table 3). Greater than 50% (100%) of the dominant plant species are hydrophytic; therefore, this site meets the criterion for predominance of hydrophytic vegetation.

Table 3. FAP 322 (U.S. 51) Wetland mitigation site vegetation sampling data including frequency, cover, and importance value for all species sampled in 2004 (dominants are in bold). Trend since the previous year is also given.

Species	Indicator	Frequency	Relative Frequency	Cover	Relative Cover	Importance Value	Trend
<i>Typha angustifolia</i>	OBL	0.83	24.27	36.0	58.62	41.44	↑
<i>Leersia oryzoides</i>	OBL	0.53	15.53	6.50	10.58	13.06	↑
<i>Echinochloa muricata</i>	OBL	0.30	8.74	5.17	8.41	8.58	↓
<i>Scirpus tabernaemontani</i>	OBL	0.27	7.77	2.67	4.34	6.05	↑
<i>Eleocharis erythropoda</i>	OBL	0.07	1.94	2.92	4.75	3.35	↑
<i>Bidens cernua</i>	OBL	0.13	3.88	1.58	2.58	3.23	↑
<i>Asclepias incarnata</i>	OBL	0.17	4.85	0.83	1.36	3.11	↑
<i>Cyperus esculentus</i>	FACW	0.13	3.88	0.75	1.22	2.55	↓
<i>Polygonum persicaria</i>	FACW	0.13	3.88	0.75	1.22	2.55	↓
<i>Festuca pratensis</i>	FACU-	0.10	2.91	1.08	1.76	2.34	↑
<i>Hordeum jubatum</i>	FAC+	0.10	2.91	0.25	0.41	1.66	↑
<i>Ipomaea lacunosa</i>	FACW	0.10	2.91	0.25	0.41	1.66	↑
<i>Typha latifolia</i>	OBL	0.07	1.94	0.58	0.95	1.45	↑
<i>Cyperus acuminatus</i>	OBL	0.07	1.94	0.17	0.27	1.11	↑
<i>Juncus torreyi</i>	FACW	0.07	1.94	0.17	0.27	1.11	↑
<i>Potamogeton pectinatus</i>	OBL	0.07	1.94	0.17	0.27	1.11	↓
<i>Rumex crispus</i>	FAC+	0.07	1.94	0.17	0.27	1.11	↑
<i>Aster pilosus</i>	FACU-	0.03	0.97	0.50	0.81	0.89	new
<i>Penthorum sedoides</i>	OBL	0.03	0.97	0.50	0.81	0.89	new
<i>Hibiscus trionum</i>	UPL	0.03	0.97	0.08	0.14	0.55	↓
<i>Polygonum pensylvanicum</i>	FACW+	0.03	0.97	0.08	0.14	0.55	↑
<i>Populus deltoides</i>	FAC+	0.03	0.97	0.08	0.14	0.55	new
<i>Salix exigua</i>	OBL	0.03	0.97	0.08	0.14	0.55	new
<i>Xanthium strumarium</i>	FAC	0.03	0.97	0.08	0.14	0.55	↓
				51.92			↑
bare ground		3.43	100.00	61.42	100.00	100.00	

Dominant species are in bold

B. Presence of Hydric Soils – The performance criterion requires that hydric soil characteristics be present, or conditions favorable for hydric soil formation should persist. The soils on this site in 1999 were mapped as Drummer silty clay loam and Flanagan silt loam (Coopridge and Ketzner 1999). Since then, some of the non-hydric parts of this site have been excavated and altered to lower the surface. This is most evident in the northern end of the site where the substratum of the somewhat poorly drained Flanagan is exposed leading to the appearance of weak redox features at the surface. Over the last year or so these soils have started to develop characteristics of their own based on their new pedogenic conditions, therefore expanding the hydric soil boundary. At the time of the field visit much of the site was inundated. A typical pedon is described below.

Table 4. Description of the wetland soils at the FAP 322 wetland monitoring site.

Depth(in)	Matrix Color	Concentrations	Depletions	Texture	Structure
0-6	10YR 2/1			Silty Clay Loam	Sub-Blocky
6-26	10YR 2/1		2.5Y 5/1	Silty Clay Loam	Sub-Blocky
26-40	5Y 4.5/1.5	7.5YR 5/8	5Y 5/1	Silty Clay Loam	Massive
40-51	2.5Y 2.5/1	10YR 5/8	2.5Y 5/2	Silty Clay Loam to Clay Loam	Massive

There are a few areas to the north and south of the hydric soils and along the edges that have very little chance of becoming hydric due to their landscape position. An average pedon for the drier soils around the edge is also described below.

Table 5. Description of the non-wetland soils at the FAP 322 wetland monitoring site.

Depth(in)	Matrix Color	Concentrations	Depletions	Texture	Structure
0-6	10YR 2/1	7.5 YR 5/8		Silty Clay Loam	Angular Blocky to Platy
6-13	10YR 6/6	10 YR 4/6		Silty Clay Loam	Weak Sub-Blocky to Massive

C. Presence of Wetland Hydrology – The performance criterion requires that the compensation area must be either permanently or periodically inundated at average depths less than 2m (6.6 ft) or have soils that are saturated to the surface for at least 12.5% of the growing season*. The ISGS initiated water level monitoring at this site in September 2000. Their findings for 2004 indicate that 2.4 ha (5.9 ac) out of a total site area of approximately 4.7 ha (11.6 ac) satisfied the wetland hydrology criterion for greater than 5% of the growing season. Included within this area are 2.0 ha (4.9 ac) that conclusively satisfied the wetland hydrology criterion for 12.5% of the growing season (Plankell and Pociask 2004; Figure 1). The area of satisfactory wetland hydrology is down somewhat from 2003 [2.6 ha (6.3 ac)] and 2002 [3.0 ha (7.4 ac)] data (Watson and Sabatini 2002; Watson and Sabatini 2003).

* In some cases wetland hydrology can be met when a site is inundated or saturated for 5% to 12.5% of the growing season (Environmental Laboratory 1987).

Decatur, U.S. Route 51 Wetland Compensation Site (FAP 322)

Estimated Areal Extent of 2004 Wetland Hydrology

Based on data collected between September 1, 2003 and September 1, 2004

map based on USGS digital orthophotograph Decatur, SW quarter quadrangle
produced from 4/14/98 aerial photography (ISGS 2002)

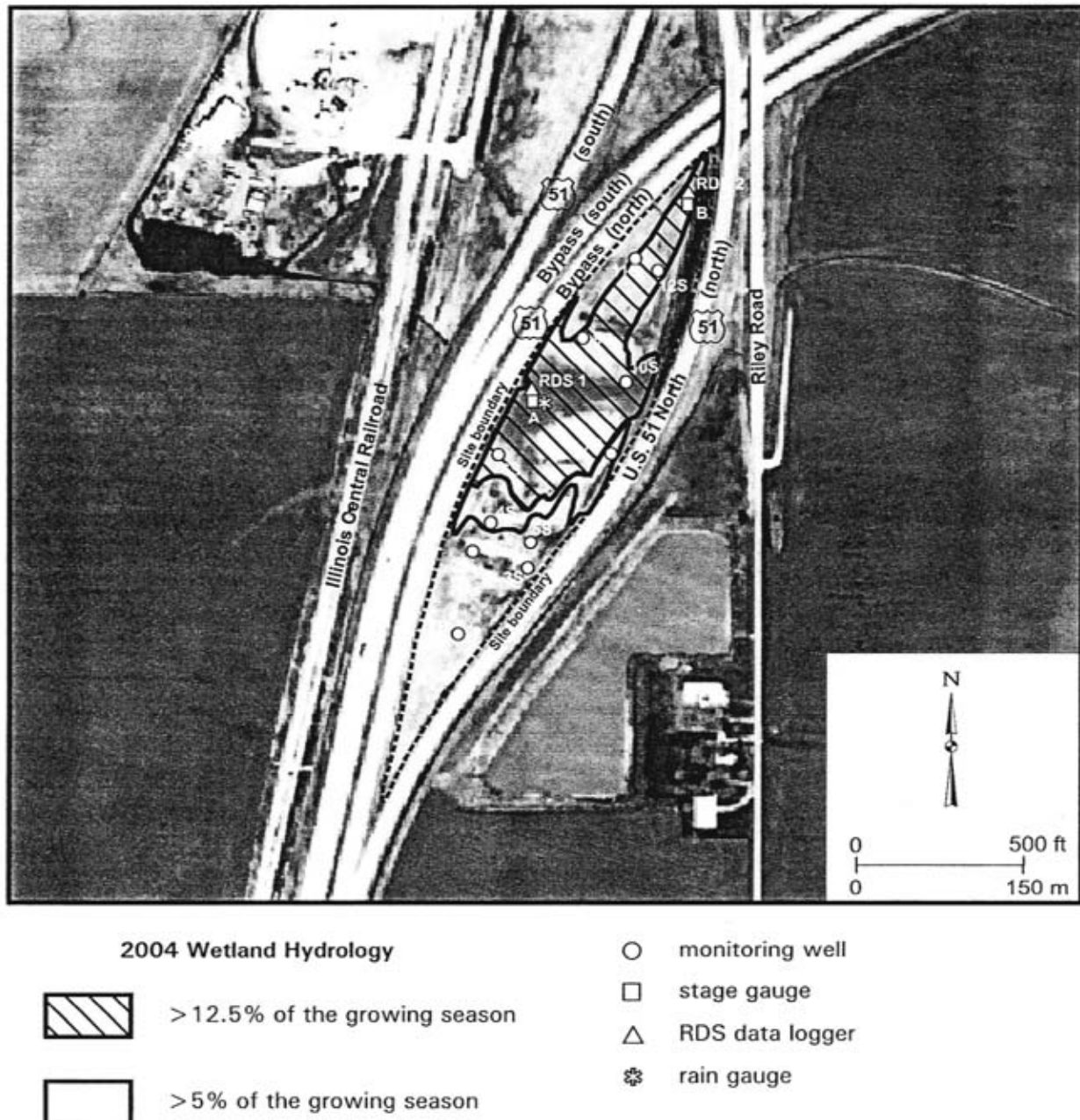


Figure 1. 2004 aerial extent of wetland hydrology for FAP 322 wetland monitoring site (prepared by ISGS, Plankell and Pociask 2004)

During visits to the site, the following indicators of wetland hydrology were present: areas of inundation with truly aquatic species (*Potamogeton pectinatus*), algal mats, mud cracks, and some areas of surface or near surface saturation. Continued monitoring activities will be needed to make a conclusive determination and to establish extent of the wetland area.

Project Goal #2: A native, non-weedy, emergent wetland community will be created.

Many weedy native and non-native species were present during the first and second years of sampling. This has improved each year as perennial species have become established. In 2004, forty-one out of fifty-one (80%) plant species found at this site were native, twenty-six (51%) species are considered non-weedy, and thirty-six (71%) were perennials. When combined only 45% (23/51) of the species found at this wetland site were native, non-weedy, and perennial. Although the vegetation composition present at this site continues to improve, project goal #2 was not satisfied in 2004. Furthermore, the site continues to be dominated by *Typha angustifolia*, the non-native, narrow-leaf cattail.

Summary and Recommendations

Floristic Quality Index – The FQI has continued to increase since the first year of monitoring (Marcum *et al.* 2002). The FQI score for this wetland mitigation site went from 7.8 in 2002 to 13.6 in 2003 to 16.0 in 2004 (Marcum *et al.* 2002; Marcum and Kurylo 2003). Likewise, the mean C value has increased from 1.6 in 2002 to 2.5 in 2004. These current values are indicative of fair natural quality. The vegetation at this site has become established with perennial species that are forming a more stable plant community. As this has occurred, the FQI and the mean C values have risen. It is recommended, however, that additional emergent hydrophytes be planted at this wetland creation site to further insure that a high quality wetland community is created. A list of possible additions to the site is included in Table 6 below. These species are all known from Macon County and are suitable for wet prairie/marsh plant communities. Furthermore, the wetland compensation plan (IDOT 1996) states that the created wetland should be aesthetically appealing from the road. These species would help in this regard as well. Showy mesic to dry prairie species could also be planted in the buffer surrounding the excavated basin. *Andropogon gerardii*, *Eryngium yuccifolium*, *Liatris aspera*, *Liatris pycnostachya*, *Silphium laciniatum*, *Silphium terebinthinaceum*, and *Sorghastrum nutans* might be considered.

Project Goal # 1 – At the end of the five-year monitoring period the created wetland community should be a jurisdictional wetland as defined by current federal standards. The performance criterion requires that greater than 50% of the dominant plant species be hydrophytic, that hydric soil characteristics be present, or conditions favorable for hydric soil formation should persist, and that the compensation area must be either permanently or periodically inundated at average depths less than 2m (6.6 ft) or have soils that are saturated to the surface for at least 12.5% of the growing season*. In 2004, this site exhibited dominant hydrophytic vegetation, hydric soils, and wetland hydrology.

* In some cases wetland hydrology can be met when a site is inundated or saturated for 5% to 12.5% of the growing season (Environmental Laboratory 1987).

The area satisfying wetland hydrology was found to be somewhat less than the previous two years (Plankell and Pociask 2004; Watson and Sabatini 2002; Watson and Sabatini 2003). In 2002, the area of wetland hydrology was 3.0 ha (7.4 ac) (Watson and Sabatini 2002), while in 2003, 2.6 ha (6.3 ac) satisfied the wetland hydrology criterion (Watson and Sabatini 2003). In 2004, ISGS hydrology data indicated that 2.4 ha (5.9 ac) out of a total site area of approximately 4.7 ha (11.6 ac) satisfied the wetland hydrology criterion for greater than 5% of the growing season. Included within this area are 2.0 ha (4.9 ac) that conclusively satisfied the wetland hydrology criterion for 12.5% of the growing season (Plankell and Pociask 2004; Figure 1).

INHS data from vegetation sampling, soil mapping, and general observations of wetland hydrology determine the aerial extent of the created wetland to be 1.73 ha (4.28 ac) (Appendix 1, Figure 2). Furthermore, one area at the south end of the wetland [~ 150 ft by 150 ft or 0.21 ha (0.52 ac)] currently exhibits hydric soil development and satisfies wetland hydrology. This area, however, has yet to develop hydrophytic vegetation because of the past dominance of meadow fescue, *Festuca pratensis*. The vegetation in this area is beginning to change to reflect current hydrologic conditions and it is expected that this area will be included in future site totals. When included, the total extent of wetland area is 1.94 ha (4.80 ac). This matches very closely with ISGS data [2.0 ha (4.9 ac)] at the 12.5% threshold (Plankell and Pociask 2004; Figure 1). Future data from vegetation sampling, soil investigations, and hydrologic monitoring will be used to determine the aerial extent of wetland at this site.

Project Goal #2 – A native, non-weedy, emergent wetland community will be created. The performance criterion for this goal states that 1.) at least 50% of the plant species should be non-weedy, native, perennial species and 2.) none of the dominants may be non-native, cattails, or reed canary grass. Neither part of this performance criterion was met in 2004. After the third year of monitoring, only 45% (23/51) of the species present were non-weedy, native perennials. This percentage continues to rise each year, however, to help insure the creation of a high quality wetland we suggest planting or seeding of more conservative species at this site. A number of suggested species are listed below (Table 6).

Dominant species at this created wetland site are *Leersia oryzoides* and *Typha angustifolia*, both perennial, obligate (OBL) wetland species. One of these, the non-native narrow-leaf cattail, *Typha angustifolia*, is an aggressive, weedy species. The presence of narrow-leaf cattail was noted in 2002 with an importance value (IV) of 3.3 (Marcum et al. 2002). It became one of the dominants in 2003 (IV = 8.73) and exploded in 2004 (IV = 41.44) (Marcum and Kurylo 2003). As mentioned in previous years monitoring reports, *Typha angustifolia* is likely to become even more abundant if management techniques are not employed (Apfelbaum 1985). The abundance of this aggressive, persistent weed will continue to be monitored. Management of this area by herbicide or other methods will be necessary if this project goal is to be met. If narrow-leaf cattail is not treated this created wetland site will surely fail to meet Project Goal #2. Weller (1975) and Sale and Wetzel (1983) found cutting cattail prior to flooding achieved good control. Applied Ecological Services and All Services Company (1985) had success with wick and spray applications of Roundup followed by manual clipping of cattail stems. Their treatment was done when cattail seeds were just at the ripening stage.

Table 6. Plant species recommended for wet prairie/marsh planting at the FAP 322 (U.S. 51) wetland mitigation site.

Scientific Name	Common Name	Stratum	Wetland Indicator Status	C♦	Perennial, Annual, Biennial
<i>Boltonia asteroides</i>	false aster	herb	FACW	5	Perennial
<i>Calamagrostis canadensis</i>	bluejoint grass	herb	OBL	3	Perennial
<i>Carex</i> spp.	sedge	herb	----	--	Perennial
<i>Cassia marilandica</i>	Maryland senna	herb	FACW	4	Perennial
<i>Cicuta maculata</i>	water hemlock	herb	OBL	4	Biennial
<i>Eupatorium maculatum</i>	spotted Joe-Pye weed	herb	OBL	5	Perennial
<i>Eupatorium perfoliatum</i>	common boneset	herb	FACW+	4	Perennial
<i>Helenium autumnale</i>	autumn sneezeweed	herb	FACW+	3	Perennial
<i>Hibiscus laevis</i>	halberd-leaved rose mallow	herb	OBL	4	Perennial
<i>Iris shrevei</i>	southern blue flag	herb	OBL	5	Perennial
<i>Lythrum alatum</i>	winged loosestrife	herb	OBL	5	Perennial
<i>Mimulus alatus</i>	winged monkey flower	herb	OBL	6	Perennial
<i>Mimulus ringens</i>	monkey flower	herb	OBL	5	Perennial
<i>Polygonum amphibium</i>	water smartweed	herb	OBL	3	Perennial
<i>Pycnanthemum virginianum</i>	common mountain mint	herb	FACW+	5	Perennial
<i>Sagittaria latifolia</i>	arrowhead	herb	OBL	4	Perennial
<i>Sium suave</i>	water parsnip	herb	OBL	5	Perennial
<i>Spartina pectinata</i>	freshwater cord grass	herb	FACW+	4	Perennial
<i>Vernonia fasciculata</i>	common ironweed	herb	FACW	5	Perennial

♦Coefficient of Conservatism (Taft *et al.* 1997)

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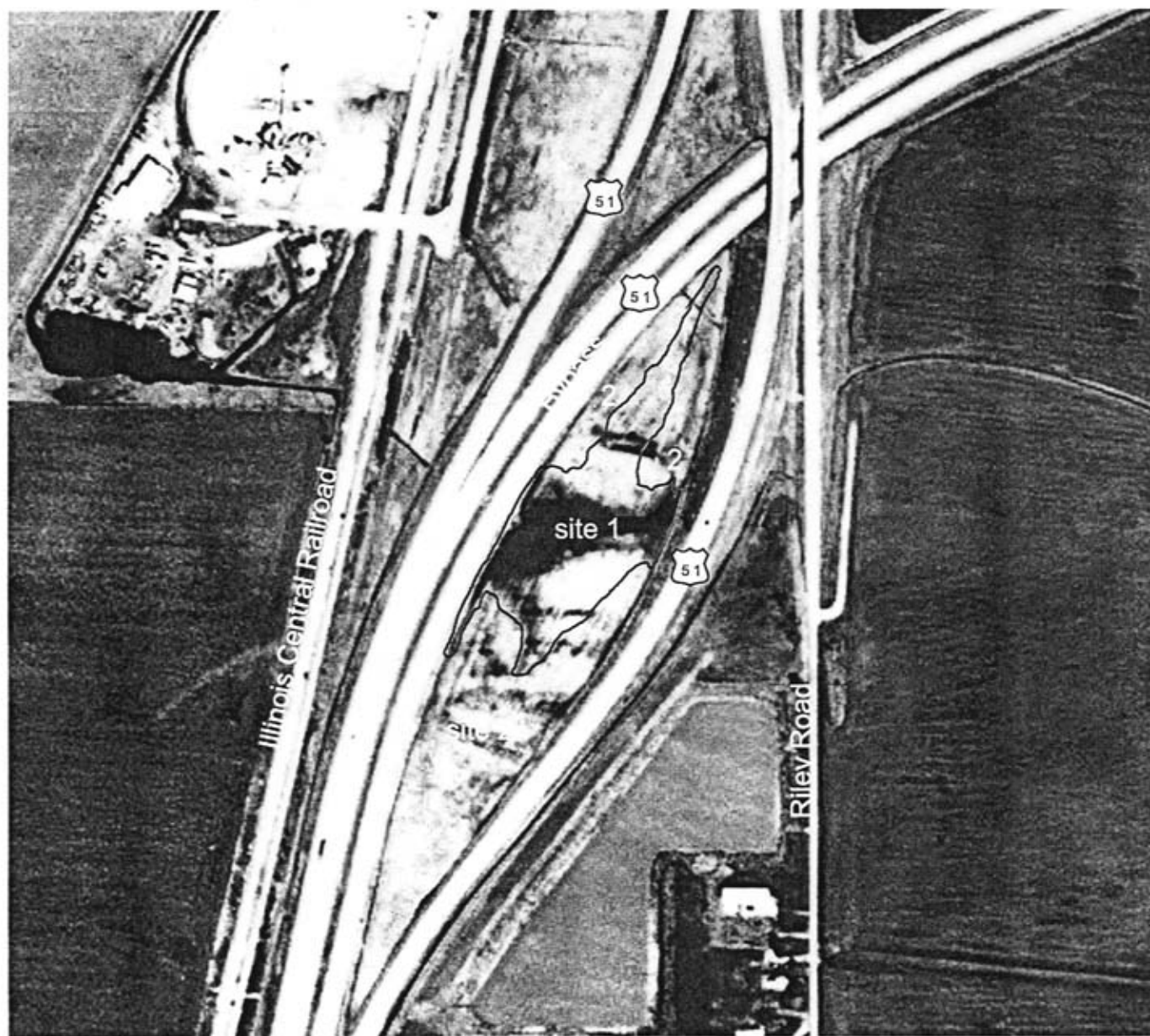
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Appendix 1.

Figure 1. Estimated aerial extent of the created wetland site (FAP 322, U.S. Route 51, Macon County, near Elwin, Illinois

FAP 322, Mitigation Monitoring Site Macon County



0 400 800 Feet

0 100 200 Meters

 Wetland site - 4.28 acres

scale 1:4800
1 inch=400 ft



Appendix 2. Wetland Determination Forms

ROUTINE ON-SITE WETLAND DETERMINATION

Site 1 (page 1 of 4)

Field Investigators: Marcum, Kurylo and Zercher

Date: 30 August, 1 September and 12 October, 2004

Project Name: FAP 322 (U.S. 51)

State: Illinois

County: Macon

Site Name: Marsh

Legal Description: NE1/4, NE1/4, SE1/4, Section 9, T. 15 N., R. 2 E. and SE1/4, SE1/4, NE1/4, Section 9, T. 15 N., R. 2 E.

Location: This wet meadow/marsh is located approximately one mile south of Elwin, IL. It is primarily within the north half of the south infield at the U.S. Route 51-Riley Road interchange.

Do normal environmental conditions exist at this site?

Yes: X No:

Has the vegetation, soils, or hydrology been significantly disturbed? Yes: X* No:

* This site is a recently excavated depression, created for mitigation purposes.

VEGETATION

Dominant Plant Species	Indicator Status	Stratum
1. <i>Leersia oryzoides</i>	OBL	herb
2. <i>Typha angustifolia</i>	OBL	herb

Percentage of dominant species that are OBL, FACW, FAC+, or FAC: 100%

Hydrophytic vegetation: Yes: X No:

Rationale: Greater than 50% of the dominants are OBL, FACW, FAC+, or FAC.

SOILS

Series and phase: Drummer silty clay loam.

On county hydric soils list? Yes: X No:

Is the soil a histosol? Yes: No: X

Histic epipedon present? Yes: No: X

Redox Concentrations? Yes: X No: Color: 7.5YR 5/8

Redox Depletions? Yes: X No: Color: 2.5Y 5/1, 5Y 5/1

Matrix color: 10YR 2/1 over 5Y 4.5/1.5

Other indicators: Depressional area.

Hydric soils? Yes: X No:

Rationale: This soil has an iron depleted matrix with iron depletions and concentrations starting below the mollic epipedon and continuing down the profile. Therefore this soil is hydric.

ROUTINE ON-SITE WETLAND DETERMINATION
Site 1 (page 2 of 4)

Field Investigators: Marcum, Kurylo and Zercher

Date: 30 August, 1 September and 12 October, 2004

State: Illinois

Site Name: Marsh

Legal Description: NE1/4, NE1/4, SE1/4, Section 9, T. 15 N., R. 2 E. and SE1/4, SE1/4, NE1/4, Section 9, T. 15 N., R. 2 E.

Location: This wet meadow/marsh is located approximately one mile south of Elwin, IL. It is primarily within the north half of the south infield at the U.S. Route 51-Riley Road interchange.

Project Name: FAP 322 (U.S. 51)
County: Macon

HYDROLOGY

Inundated: Yes: X (in part) No: Depth of standing water: up to 0.23 m (9 in)

Depth to saturated soil: saturated to surface.

Overview of hydrological flow through the system: This site is located in a depression surrounded by highway embankments. Water enters this site via precipitation, sheet flow from adjacent higher ground (road embankments), and drainage from a culvert under U.S. 51. Water leaves the site primarily via evapotranspiration and slowly through soil infiltration.

Size of watershed: Approximately 11.17 ha (27.6 ac) (IDOT 1996).

Other field evidence observed: This site has been excavated to hold water for longer periods. Areas of inundation, bare areas indicating ponded water, algal mats, and mud cracks were observed at this site.

Wetland hydrology: Yes: X No:

Rationale: A depressional landscape position and field evidence of saturation and inundation suggest that this site is saturated long enough during the growing season to meet the wetland hydrology criterion. This is supported by ISGS hydrology data for this site. Plankell and Pociask (2004) concluded that 2.0 ha (4.9 ac) satisfied the wetland hydrology criterion for greater than 12.5% of the growing season while 2.4 ha (5.9 ac) satisfied the wetland hydrology criterion for greater than 5% of the growing season in 2004 (Figure 1).

DETERMINATION AND RATIONALE:

Is the site a wetland?
Rationale for decision:

Yes: X No:
Dominant hydrophytic vegetation, hydric soils, and wetland hydrology are present; therefore, this site is a wetland. The total extent of the wetland will be determined at the end of the five-year monitoring period.

ROUTINE ON-SITE WETLAND DETERMINATION

Site 1 (page 3 of 4)

Field Investigators: Marcum, Kurylo and Zercher

Date: 30 August, 1 September and 12 October, 2004

Project Name: FAP 322 (U.S. 51)

State: Illinois

County: Macon

Site Name: Marsh

Legal Description: NE1/4, NE1/4, SE1/4, Section 9, T. 15 N., R. 2 E. and SE1/4, SE1/4, NE1/4, Section 9, T. 15 N., R. 2 E.

Location: This wet meadow/marsh is located approximately one mile south of Elwin, IL. It is primarily within the north half of the south infield at the U.S. Route 51-Riley Road interchange.

SPECIES LIST

Scientific name	Common name	Stratum	Wetland indicator Status	C♦	Perennial, Annual, Biennial
<i>Acer saccharinum</i>	silver maple	herb	FACW	1	Perennial
<i>Agrostis hyemalis</i>	hair grass	herb	FAC-	1	Perennial
<i>Amaranthus tuberculatus</i>	tall waterhemp	herb	OBL	1	Annual
<i>Ammannia coccinea</i>	long-leaved ammannia	herb	OBL	5	Annual
<i>Apocynum cannabinum</i>	dogbane	herb	FAC	2	Perennial
<i>Asclepias incarnata</i>	swamp milkweed	herb	OBL	4	Perennial
<i>Aster pilosus</i>	hairy aster	herb	FACU+	0	Perennial
<i>Aster puniceus</i>	swamp aster	herb	OBL	7	Perennial
<i>Aster simplex</i>	panicled aster	herb	FACW	3	Perennial
<i>Bidens cernua</i>	nodding beggar's ticks	herb	OBL	2	Annual
<i>Carex vulpinoidea</i>	fox sedge	herb	OBL	3	Perennial
<i>Carex</i> sp.	sedge	herb	----	--	Perennial
<i>Coreopsis tinctoria</i>	golden coreopsis	herb	FAC-	*	Annual
<i>Cyperus acuminatus</i>	taperleaf flat sedge	herb	OBL	2	Annual
<i>Cyperus esculentus</i>	yellow nut-sedge	herb	FACW	0	Perennial
<i>Cyperus strigosus</i>	straw-colored flatsedge	herb	FACW	0	Perennial
<i>Dyssodia papposa</i>	fetid marigold	herb	UPL	*	Annual
<i>Echinochloa muricata</i>	barnyard grass	herb	OBL	0	Annual
<i>Eleocharis erythropoda</i>	red-rooted spike rush	herb	OBL	3	Perennial
<i>Eupatorium altissimum</i>	tall boneset	herb	FACU	2	Perennial
<i>Eupatorium perfoliatum</i>	common boneset	herb	FACW+	4	Perennial
<i>Eupatorium serotinum</i>	late boneset	herb	FAC+	1	Perennial
<i>Festuca pratensis</i>	meadow fescue	herb	FACU-	*	Perennial
<i>Helenium autumnale</i>	autumn sneezeweed	herb	FACW+	3	Perennial
<i>Hibiscus trionum</i>	flower-of-an-hour	herb	UPL	*	Annual
<i>Hordeum jubatum</i>	squirrel-tail grass	herb	FAC+	*	Perennial
<i>Ipomoea lacunosa</i>	small white morning-glory	herb	FACW	1	Annual
<i>Juncus interior</i>	inland rush	herb	FAC+	3	Perennial
<i>Juncus torreyi</i>	Torrey's rush	herb	FACW	3	Perennial
<i>Leersia oryzoides</i>	rice cutgrass	herb	OBL	3	Perennial

Species list continued on following page.

ROUTINE ON-SITE WETLAND DETERMINATION

Site 1 (page 4 of 4)

Field Investigators: Marcum, Kurylo and Zercher

Date: 30 August, 1 September and 12 October, 2004

State: Illinois

Site Name: Marsh

Legal Description: NE1/4, NE1/4, SE1/4, Section 9, T. 15 N., R. 2 E. and SE1/4, SE1/4, NE1/4, Section 9, T. 15 N., R. 2 E.

Location: This wet meadow/marsh is located approximately one mile south of Elwin, IL. It is primarily within the north half of the south infield at the U.S. Route 51-Riley Road interchange.

Project Name: FAP 322 (U.S. 51)

County: Macon

SPECIES LIST

Scientific name	Common name	Stratum	Wetland indicator status	C♦	
<i>Lobelia cardinalis</i>	cardinal-flower	herb	OBL	6	Perennial
<i>Lobelia siphilitica</i>	blue cardinal-flower	herb	FACW+	4	Perennial
<i>Panicum capillare</i>	witch grass	herb	FAC	0	Annual
<i>Penthorum sedoides</i>	ditch stonecrop	herb	OBL	2	Perennial
<i>Polygonum pensylvanicum</i>	giant smartweed	herb	FACW+	1	Annual
<i>Polygonum persicaria</i>	spotted lady's thumb	herb	FACW	*	Annual
<i>Populus deltoides</i>	eastern cottonwood	shrub, herb	FAC+	2	Perennial
<i>Potamogeton pectinatus</i>	comb pondweed	herb	OBL	5	Perennial
<i>Pycnanthemum virginianum</i>	common mountain mint	herb	FACW+	5	Perennial
<i>Rumex crispus</i>	curly dock	herb	FAC+	*	Perennial
<i>Salix exigua</i>	sandbar willow	shrub, herb	OBL	1	Perennial
<i>Salix nigra</i>	black willow	shrub	OBL	3	Perennial
<i>Scirpus tabernaemontanii</i>	great bulrush	herb	OBL	4	Perennial
<i>Setaria glauca</i>	pigeon grass	herb	FAC	*	Annual
<i>Sida spinosa</i>	prickly sida	herb	FACU	*	Annual
<i>Solidago canadensis</i>	Canada goldenrod	herb	FACU	1	Perennial
<i>Solidago riddellii</i>	Riddell's goldenrod	herb	OBL	7	Perennial
<i>Sparganium eurycarpum</i>	burreed	herb	OBL	5	Perennial
<i>Typha angustifolia</i>	narrow-leaved cattail	herb	OBL	*	Perennial
<i>Typha latifolia</i>	cattail	herb	OBL	1	Perennial
<i>Xanthium strumarium</i>	cocklebur	herb	FAC	0	Annual

♦ Coefficient of Conservatism (Taft *et al.* 1997)

*Non-native species

$$\text{mean C value (mCv)} = \sum C/N = 101/40 = 2.5$$

$$\text{FQI} = \sum C/\sqrt{N} = 101/(\sqrt{40}) = 16.0$$

Determined by: Paul Marcum (vegetation and hydrology)
Jessica Kurylo (soils and hydrology)
Brad Zercher (GPS, GIS and hydrology)
Illinois Natural History Survey
Center for Wildlife Ecology
607 East Peabody Drive
Champaign, Illinois 61820
(217) 333-8459 (Marcum)

ROUTINE ON-SITE WETLAND DETERMINATION

Site 2 (page 1 of 4)

Field Investigators: Marcum, Kurylo and Zercher

Date: 30 August, 1 September and 12 October, 2004

Project Name: FAP 322 (U.S. 51)

State: Illinois

County: Macon

Site Name: Non-native Grassland/Forbland

Legal Description: NE1/4, SE1/4, Section 9, T. 15 N., R. 2 E. and SE1/4, SE1/4, NE1/4, Section 9, T. 15 N., R. 2 E.

Location: This non-native grassland is located approximately 1 mile south of Elwin, IL. It is primarily within the south half of the south infield at the U.S. Route 51-Riley Road interchange. This site also extends around site #1 in the north section of the infield.

Do normal environmental conditions exist at this site?

Yes: X No:

Has the vegetation, soils, or hydrology been significantly disturbed? Yes: No: X

VEGETATION

Dominant Plant Species	Indicator Status	Stratum
1. <i>Aster pilosus</i>	FACU+	herb
2. <i>Festuca pratensis</i>	FACU-	herb
3. <i>Melilotus alba/officinalis</i>	FACU	herb
4. <i>Setaria faberi</i>	FACU+	herb
5. <i>Solidago canadensis</i>	FACU	herb

Percentage of dominant species that are OBL, FACW, FAC+, or FAC: 0%

Hydrophytic vegetation: Yes: No: X

Rationale: Less than 50% of the dominants are OBL, FACW, FAC+, or FAC.

SOILS

Series and phase: Flanagan silt loam.

On county hydric soils list? Yes: No: X

Is the soil a histosol? Yes: No: X

Histic epipedon present? Yes: No: X

Redox Concentrations? Yes: X No: Color: 7.5YR 5/8 & 10YR 4/6

Redox Depletions? Yes: No: X

Matrix color: 10YR 2/1 over 10YR 6/6

Other indicators: Higher topographic position relative to wetland site.

Hydric soils? Yes: No: X

Rationale: A soil matrix color with a chroma greater than 2 is too bright to be considered hydric.

ROUTINE ON-SITE WETLAND DETERMINATION

Site #2 (page 2 of 4)

Field Investigators: Marcum, Kurylo and Zercher

Date: 30 August, 1 September and 12 October, 2004

State: Illinois

Site Name: Non-native Grassland/Forbland

Legal Description: NE1/4, SE1/4, Section 9, T. 15 N., R. 2 E. and SE1/4, SE1/4, NE1/4, Section 9, T. 15 N., R. 2 E.

Location: This non-native grassland is located approximately 1 mile south of Elwin, IL. It is primarily within the south half of the south infield at the U.S. Route 51-Riley Road interchange. This site also extends around site #1 in the north section of the infield.

Project Name: FAP 322 (U.S. 51)

County: Macon

HYDROLOGY

Inundated: Yes: No: X Depth of standing water: NA

Depth to saturated soil: > 1.2 m (48 in)

Overview of hydrological flow through the system: This site is at a slightly to noticeably higher elevation than site #1. It is level to slightly sloping. Water enters this site via precipitation and sheet flow from adjacent higher ground. Water leaves the site via evapotranspiration, soil infiltration, and through sheet flow into site #1.

Size of watershed: Approximately 11.17 ha (27.6 ac) (IDOT 1996).

Other field evidence observed: none

Wetland hydrology: Yes: No: X

Rationale: Field observations suggest that this site is both too high of elevation and too sloping to satisfy the wetland hydrology criterion. In our opinion, the site is not saturated long enough during the growing season to meet the wetland hydrology criterion.

DETERMINATION AND RATIONALE:

Is the site a wetland?	Yes: No: X
Rationale for decision:	Dominant hydrophytic vegetation, hydric soils, and wetland hydrology were all absent; therefore, this site is not a wetland. The National Wetland Inventory did not code this site as a wetland.

Determined by: Paul Marcum (vegetation and hydrology)
Jessica Kurylo (soils and hydrology)
Brad Zercher (GPS, GIS and hydrology)
Illinois Natural History Survey
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(217) 333-8459 (Marcum)

ROUTINE ON-SITE WETLAND DETERMINATION

Site #2 (page 3 of 4)

Field Investigators: Marcum, Kurylo and Zercher

Date: 30 August, 1 September and 12 October, 2004

State: Illinois

Project Name: FAP 322 (U.S. 51)

County: Macon

Site Name: Non-native Grassland/Forbland

Legal Description: NE1/4, SE1/4, Section 9, T. 15 N., R. 2 E. and SE1/4, SE1/4, NE1/4, Section 9, T. 15 N., R. 2 E.

Location: This non-native grassland is located approximately 1 mile south of Elwin, IL. It is primarily within the south half of the south infield at the U.S. Route 51-Riley Road interchange. This site also extends around site #1 in the north section of the infield.

SPECIES LIST

Scientific name	Common name	Stratum	Wetland indicator status	C♦
<i>Abutilon theophrasti</i>	velvet-leaf	herb	FACU-	*
<i>Amaranthus tuberculatus</i>	tall waterhemp	herb	OBL	1
<i>Ambrosia artemisiifolia</i>	common ragweed	herb	FACU	0
<i>Apocynum cannabinum</i>	dogbane	herb	FAC	2
<i>Asclepias incarnata</i>	swamp milkweed	herb	OBL	4
<i>Asclepias syriaca</i>	common milkweed	herb	UPL	0
<i>Asclepias verticillata</i>	horsetail milkweed	herb	UPL	1
<i>Aster pilosus</i>	hairy aster	herb	FACU+	0
<i>Aster puniceus</i>	swamp aster	herb	OBL	7
<i>Celtis occidentalis</i>	hackberry	herb	FAC-	3
<i>Cichorium intybus</i>	blue sailors	herb	UPL	*
<i>Cirsium arvense</i>	Canada thistle	herb	FACU	*
<i>Cirsium discolor</i>	pasture thistle	herb	UPL	3
<i>Conium maculatum</i>	poison hemlock	herb	FACW	*
<i>Conyza canadensis</i>	horseweed	herb	FAC-	0
<i>Coreopsis tinctoria</i>	golden coreopsis	herb	FAC-	*
<i>Daucus carota</i>	Queen Anne's lace	herb	UPL	*
<i>Echinacea purpurea</i>	broad-leaved purple cone-flo	herb	UPL	6
<i>Eupatorium altissimum</i>	tall boneset	herb	FACU	2
<i>Eupatorium serotinum</i>	late boneset	herb	FAC+	1
<i>Festuca pratensis</i>	meadow fescue	herb	FACU-	*
<i>Gaura biennis</i>	butterfly-weed	herb	FACU-	2
<i>Helenium autumnale</i>	autumn sneezeweed	herb	FACW+	3
<i>Hibiscus trionum</i>	flower-of-an-hour	herb	UPL	*
<i>Hordeum jubatum</i>	squirrel-tail	herb	FAC+	*
<i>Iris shrevei</i>	southern blue flag	herb	OBL	5
<i>Lobelia cardinalis</i>	cardinal-flower	herb	OBL	6
<i>Lobelia siphilitica</i>	blue cardinal-flower	herb	FACW+	4
<i>Melilotus alba</i>	white sweet clover	herb	FACU	*

Species list continued on following page.

ROUTINE ON-SITE WETLAND DETERMINATION
Site #2 (page 4 of 4)

Field Investigators: Marcum, Kurylo and Zercher

Date: 30 August, 1 September and 12 October, 2004

State: Illinois

Site Name: Non-native Grassland/Forbland

Legal Description: NE1/4, SE1/4, Section 9, T. 15 N., R. 2 E. and SE1/4, SE1/4, NE1/4, Section 9, T. 15 N., R. 2 E.

Location: This non-native grassland is located approximately 1 mile south of Elwin, IL. It is primarily within the south half of the south infield at the U.S. Route 51-Riley Road interchange. This site also extends around site #1 in the north section of the infield.

Project Name: FAP 322 (U.S. 51)
County: Macon

SPECIES LIST (continued)

Scientific name	Common name	Stratum	Wetland indicator status	C♦
<i>Melilotus officinalis</i>	yellow sweet clover	herb	FACU	*
<i>Oenothera biennis</i>	evening primrose	herb	FACU	1
<i>Panicum capillare</i>	witch grass	herb	FAC	0
<i>Pastinaca sativa</i>	parsnip	herb	UPL	*
<i>Polygonum persicaria</i>	spotted lady's thumb	herb	FACW	*
<i>Pycnanthemum virginianum</i>	common mountain mint	herb	FACW+	5
<i>Ratibida columnifera</i>	long-headed coneflower	herb	UPL	*
<i>Ratibida pinnata</i>	drooping coneflower	herb	UPL	4
<i>Rudbeckia laciniata</i>	cutleaf coneflower	herb	FACW+	3
<i>Rumex crispus</i>	curly dock	herb	FAC+	*
<i>Setaria faberi</i>	giant foxtail	herb	FACU+	*
<i>Setaria glauca</i>	pigeon grass	herb	FAC	*
<i>Sida spinosa</i>	prickly sida	herb	FACU	*
<i>Solidago canadensis</i>	Canada goldenrod	herb	FACU	1
<i>Solidago riddellii</i>	Riddell's goldenrod	herb	OBL	7
<i>Solidago rigida</i>	rigid goldenrod	herb	FACU-	4
<i>Trifolium hybridum</i>	alsike clover	herb	FAC-	*
<i>Trifolium pratense</i>	red clover	herb	FACU+	*

♦ Coefficient of Conservatism (Taft *et al.* 1997)

*Non-native species

mean C value (mCv) = $\sum C/N = 75/27 = 2.8$

FQI = $mCv/(\sqrt{N}) = 75/(\sqrt{27}) = 14.4$

Appendix 3. Photos of wetland creation sites



Photo 1. View from north end of wetland, looking south. A line from the surface water monitoring station (RDS-2) in the foreground to the right side of the road sign in the background (no longer visible because of *Typha angustifolia* expansion) is approximately 205° bearing. This is the location of the baseline established for vegetative sampling.



Photo 2. View from east side of the wetland looking toward the *Typha angustifolia* patch near U.S. 51.



Photo 3. Looking south from the middle of the wetland near the north end.



Photo 4. View from the south end of the wetland looking north. Note *Festuca pratensis* in the foreground. This is site #2, the non-native grassland.



Photo 5. View of site #2, the non-native grassland from near the south end of the wetland.



Photo 6. View of *Typha angustifolia* patch looking east from along U.S. 51.